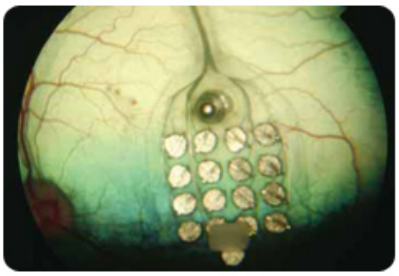
LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Feb. 19-22, 2013.

VISION QUEST



Argus II. A retinal prosthesis contains a small implantable chip with electrodes. These electrodes stimulate the retina and help people regain limited vision.

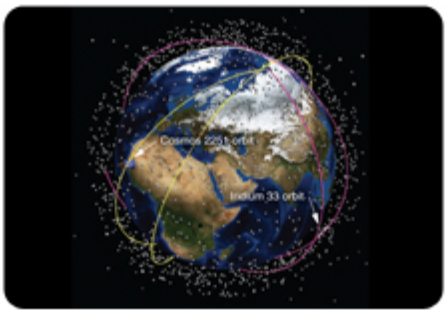
A device that could help restore vision to thousands of people has been approved by the U.S. Food and Drug Administration for blind individuals with end-stage retinitis pigmentosa.

Lawrence Livermore engineers played a key role in the project by developing the microelectrode array for the epiretinal prosthesis.

The artificial retina (or bionic eye), dubbed the Argus II Retinal Prosthesis System (developed and manufactured by Second Sight Medical Products Inc, Sylmar, Calif.), may prove to be an aid to those blinded by the disease *retinitis pigmentosa*, which can run in families and is estimated by the National Institutes of Health to affect about 1 in 4,000 people in the United States. Over the 10-year lifetime of the project, the Department of Energy provided $75.2 million for the development of technologies aimed at advancing artificial retinas like the Argus II, which was based on work by a consortium of scientists using advanced technologies developed by several of the department's national laboratories.

To see more, go to KGO TV .

MONITORING THE CLUTTER



A Livermore visualization shows the orbits of the two satellites prior to the collision among the hundreds of other orbiting satellites.

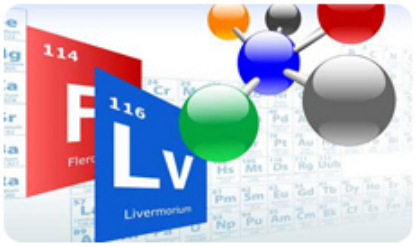
Each day, hundreds of active satellites as well as tens of thousands of pieces of "space junk" -- defunct satellites, bits of booster rockets and lost astronaut tools -- orbit the Earth.

This space junk became front page news several years ago when a defunct Russian satellite and a privately owned American communications satellite collided near the North Pole. The incident produced clouds of debris that quickly joined the orbital junk parade, increasing the possibility of future accidents.

Lawrence Livermore is working to improve the nation's capabilities for detecting and monitoring threats to U.S. space operations with a set of analysis, modeling, simulation and visualization tools called the Testbed for Space Situational Awareness (TESSA).

To see an interview with the Lab's John Henderson, one of the researchers working on the project, go to KTVU.

APS LAB PULLS RANK



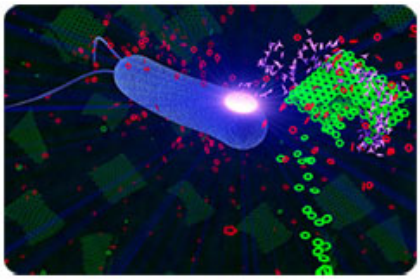
Lawrence Livermore National Laboratory garnered two top physics stories from the American Physical Society's list of the top physics newsmakers of 2012.

In May 2012, the two most recently discovered elements were given names for the physics labs that discovered them. Number 114 is flerovium (Fl) after the Flerov Laboratory of Nuclear Reactions in Dubna, Russia, and number 116 is livermorium (Lv) after the Lawrence Livermore National Laboratory.

The title of the "World's Fastest Computer" returned to the United States in June 2012 when Lawrence Livermore National Laboratory's Sequoia machine topped out at 16.2 petaflops. Then in November, Oak Ridge National Laboratory one-upped the Lab with its Titan supercomputer, which hit 17.59 petaflops. U.S. computers now hold the top two slots for the first time since 2009, beating out Japan's K computer. Sequoia is used by the military to simulate nuclear detonations.

For a list of all the top 2012 physics stories, go to *APS News*.

BUGS PUT THE 'BIO' IN BIOFUELS



"The 'Bio' in Biofuels: New Energy from Ancient Life," by Lab scientists Michael Thelen and Rhona Stuart, and Tracy High School teacher Ken Wedel, is the fourth and final lecture in the Science on Saturday series to be held Feb. 23 at the Bankhead Theater, 2400 First St., Livermore. Two presentations will be offered -- 9:30 and 11:15 a.m.

The most ancient forms of life, bacteria, are exceptionally tiny organisms, yet they have contributed in big ways to the planet. Although long recognized for causing disease, microbes have had a tremendous impact on human survival, and now can help solve some of the urgent energy problems. The presenters will discuss how the microbial production of biofuels represents a new source of energy that can be constantly renewed.

Seating is on a first-come, first-served basis; there is no pre-registration. Directions and maps are available on the Web. Science on Saturday is presented by LLNL's Science Education Program.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance. To send input to the *Livermore Lab Report*, send e-mail.